

**Public Works Division  
Indiana Department of Administration  
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**Standards for Design and Construction**

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## **INTRODUCTION**

*The January, 2000 update to these standards included new information about Public Works Green Building efforts. Attention is invited to these ongoing revisions and comments are welcome.*

The Public Works Division of the Indiana Department of Administration (DAPW) provides design and construction services to twelve state agencies. These agencies operate institutions and other facilities in virtually every county in Indiana. These standards are established as guidelines for design and development of State owned building projects with a broad range of parameters, including but not limited to, building renovations, additions, new construction, preventative maintenance and emergency repairs for buildings, support structures, utilities and infrastructures; with or without site selection. These standards are written based on the design of a new building or alterations to an existing building with an architect as principal designer. Other projects for engineered systems with an engineer as principal designer should comply with these standards where applicable.

These standards have been developed to promote a better understanding of the DAPW mission, to assist the Designer in the preparation of bid documents, and to establish a minimum quality of aesthetics and design to facilitate uniformity in DAPW projects. DAPW shall require all Designers of new and remodeled facilities to utilize Sustainable Design principles and Green Building Design resources while providing for the essential needs critical to the achievement of project goals. The Designer shall address the integration of environmental concerns with programming tasks from the outset of the project. DAPW will encourage the design and construction of buildings that surpass current codes, provide healthy structures having good indoor air quality, and promote preservation of the environment. These recommendations reflect the experience of DAPW with systems, materials and products. For most DAPW projects, the final responsibility for the design and final material selections rests with the Designer. Uniform construction documentation is critical so that the documents are clear, concise, complete, correct, and easy to use. Since these standards are constantly evolving, please obtain the most recent version immediately prior to the construction document phase.

Manuals and other DAPW documents are available at the DAPW website: <http://www.state.in.us/idoa/pwd>

These standards are intended for State owned facilities. Use of these guidelines for private sector projects is encouraged, but is by no means mandatory. DAPW welcomes questions and comments.

## **I. GENERAL STANDARDS**

### **1. Priorities to be Addressed:**

Each participant in the design of a Public Works project should work with the following priorities in mind: 1) Absolutely essential needs critical to the achievement of project goals, 2) highly desirable needs which directly support project goals, and 3) needs which should be fulfilled to the extent that authorized funding is available.

### **2. Quality Level:**

The life expectancy of a new State structure is 75 years. To achieve this goal, specify high quality environmentally responsible materials and products, with a recycled material content where possible, to be installed in accordance with manufacturers' instructions and recommendations. Special attention is required for products, materials, and systems used in high humidity areas (defined as swimming pools, locker rooms, kitchens, baths, showers, and laundries), and for products, materials, and systems used for abuse resistance in detention, mental health, and residential school environments.

Public Works is particularly concerned with the design of the building envelope. Weather resistance, low maintenance and energy efficiency are important for roofs, walls, windows and doors. Of equal concern are the quality of engineered building systems. HVAC, plumbing, and electrical systems should incorporate high quality materials and be designed for energy efficiency, long life and ease of maintenance.

### **3. Document Review:**

The accuracy and completeness of the construction documents is the responsibility of the Designer. He/she shall provide a detailed review the documents (including those prepared by sub-consultants) for accuracy, consistency and coordination between disciplines. Designers should provide adequate horizontal and vertical building space for installation and maintenance of building systems.

The Designer and his/her consultants should read every page of specifications and examine every drawing prior to both the CD submittal and the issuance of bidding documents. This is necessary to eliminate errors, inconsistencies, and potential design problems such as insufficient clearances, incompatible equipment, and duplication or omission of work. The documents should not address directions to specific trades. If a sub-consultant wants to address a trade not his own, he/she must provide these directions to the designer for incorporation in the appropriate location.

State forms provided to the designer shall in turn be provided to consultants for review to ensure coordination and consistency.

### **4. Site Design:**

The designer is expected to use reasonable care in site design. He should closely coordinate new work with existing conditions. He shall develop land use patterns that minimize the environmental impact and contribute to the promotion and maintenance of a strong cohesive community. The designer shall provide a site resource evaluation of solar access, soils, vegetation, water resources and other natural features of the site that will guide the design. The designer shall promote the use of appropriate Indiana native species in any landscape plan.

If existing utilities are not verifiable, he should recommend further exploration. Any "assumed" conditions should be discussed with the DAPW project manager for action. The designer shall visit the site with the DAPW project manager, consult the master plan if available, and review available record documents.

Provide a soils investigation when authorized by DAPW. Obtain quotations from three certified and registered soils engineers for borings and analysis and recommend one of them to DAPW. Verify the applicability of any previous soils reports provided by the State. Coordinate soil boring equipment access with the institution. Concentrate soil borings in the planned "footprint" of the structure. Include the soils report in the Project Manual.

Provide a site survey to include boundaries, topography and/or utilities when authorized by DAPW. Obtain quotations from three certified and registered land surveyors for surveys and recommend one of them to DAPW. Verify any surveys and record documents provided by the State. Verify locations of utilities proposed for use in the project. Identify hazardous material locations, conditions and removal procedures. If discrepancies between existing and recorded subsurface conditions are anticipated, engage a utility locator to verify utility locations. Surveys should include grades, contours, property lines and corners, structures, streets, parking lots, trees and shrubs, as well as full information on utilities.

#### 5. Building Design:

The designer shall address the following issues: sustainable design and durability, suitability for intended occupancy, flexibility of use, adaptability for reuse (for example: open planning), life span, life cycle costs, use of renewable energy sources (passive solar and natural cooling), installation of reduced energy use high efficiency technologies (including equipment, appliances and furnishings), safety, security, ease and simplicity of maintenance, reduction of maintenance costs, energy conservation, accessibility, and indoor air quality.

Design in accordance with all current codes including (but not limited to) Indiana General Administrative Rules, Indiana Building Code, Indiana Plumbing Code, Indiana Mechanical Code, Indiana Fire Prevention Code, Indiana Electrical Code, Indiana Energy Code, Indiana Elevator Code, Indiana Handicapped Code and the Americans with Disabilities Act. Comply with local ordinances for storm drainage and for connection to municipal utilities. Code requirements shall be seen as MINIMUM standards. Stricter requirements may be found in these Standards. Provide noncombustible construction. Wood framing may be used only if authorized by DAPW. Avoid the need for waivers and variances. If they are necessary, coordinate them. There will be no additional fee except for the filing cost. Comply with regulations of the Indiana State Department of Health (ISDH), JCAHO (Joint Commission on Accreditation of Health Organizations) and the Life Safety Code where required by some institutions.

Follow agency and individual institution guidelines. The Department of Correction, Department of Health, and Division of Mental Health of the Family and Social Services Administration are examples of agencies that have special guidelines. Individual institutions such as the Indiana School for the Blind, the Indiana School for the Deaf, and the Indiana Soldiers' and Sailors' Children's Home may have guidelines specific to their populations.

If a historic structure is involved, review the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995) and consult with the Division of Historic Preservation and Archaeology of the Indiana Department of Natural Resources.

Create and promote accessibility wherever possible. Address issues raised by the Americans with Disabilities Act. Meet the requirements of the Indiana Handicapped Code and exceed them where noted. Endeavor to accommodate staff and residents with vision impairment, hearing impairment, and ambulatory injuries and illnesses. Consult the agency or institution for specialized access beyond requirements of the building codes or the ADA.

The Designer is encouraged to create and promote sustainable design. The Governor's executive order #99-07 directs participation in the Energy Star building program of the U. S. Environmental Protection Agency. Specify products, materials and building systems accordingly. Do not specify or use products or materials which contain asbestos, PCBs, mercury or lead. Refer to the *Appendix* for a partial listing of Internet websites oriented to sustainable design, recycled materials and products and green buildings.

Room Numbering: Assignment of room numbers for individual rooms shall be coordinated with DAPW. Match the institution or agency numbering system.

Keying System: Under most circumstances, locks will be keyed under a grand master key system. Keying requirements will be coordinated by DAPW. Construction master keying system shall be used where appropriate until substantial completion.

**Maintenance and Cleaning Needs:** In new building design, provide a lockable area for receiving and storing cleaning supplies, spare parts, ladders, tools, equipment, etc. Provide an area where a normal accumulation of trash (and recycling bins) can be stored and from which it can be hauled away. Provide a custodial closet on each floor (or unit or wing) with either a mop receptor or a deep sink.

**Indoor Air Quality:** Develop an *Indoor Pollutant Source Control Plan* to reduce or eliminate problems including but not limited to: airborne asbestos, mercury, lead, carbon monoxide, formaldehyde, smoke, fiberglass, allergens, and microorganisms; insufficient filtered outside air during minimum supply air periods; outside air being drawn into the building from contaminated sources (analyze prevailing winds to establish intake and exhaust locations); negative building pressure during minimum supply air periods; and microbial infestation due to high humidity or stagnant water in drains or pans.

**Installation of "Wet" and "Dry" Materials:** During construction, use the least amount feasible of wet materials such as adhesives, sealants, glazes, caulks, paints, and other materials off-gassing VOC into the air. Written control strategies for achieving minimal use of wet materials shall be approved in writing by DAPW prior to installation. Dry furnishing materials such as carpet, acoustical tile or panels, floor tile, office furniture, wood shelving, and textiles shall not be installed until wet materials have been applied and allowed to dry. Drying time shall be chosen so that pollutant emission rates are below the maximum specified. Dry furnishings and materials shall be allowed to air out prior to installation in a building. Provide a minimum of seven days of continuous ventilation by outside air between completion of installation and substantial completion.

## 6. Systems Design:

The designer shall select durable, locally produced (where possible), low maintenance materials with low-embodied-energy and high recycled content. The substructure shall have poured concrete foundations. Other foundation systems must be authorized in writing by DAPW. Base the design upon the soils engineer's recommendations. Basement construction shall provide waterproofing with protection board, taking hydrostatic pressure into consideration, and providing a perimeter drainage system. Follow recommended practices to minimize entry of Radon, mold, pesticides, pests and other health hazards into the building. The superstructure shall be structural steel framing, poured-in-place or structural precast concrete. Masonry bearing walls must be authorized by DAPW. Exterior walls shall be face brick to match or complement surrounding structures, architectural precast concrete, or stone. Roofs shall provide positive drainage. Low slope roofs shall be a membrane material; pitched roofs shall be shingles or metal. Interior partitions shall be lightweight concrete unit masonry (6" thick minimum) or steel studs with 5/8" thick Type X gypsum board. Stairways shall be steel with concrete filled pans and vinyl composition tile finish. Finishes for high humidity areas shall have Portland cement plaster ceilings, ceramic tile wall finish, ceramic or quarry tile floor finish. Provide vinyl composition tile floor finish elsewhere. Do not use solvent-based finishes, adhesives, particleboard or other products that off-gas formaldehyde and other VOC into the air. Minimize use of carpeting and vinyl wall covering. Use epoxy coatings on masonry. Use latex enamel paint (gloss and eggshell lusters) on gypsum board. Do not use latex flat paint. Building services (conveying systems, plumbing, HVAC, fire protection, fire alarms, and electrical) shall be selected to accommodate the structure's function and design with highly efficient HVAC equipment operations, use of high efficiency lighting and appliances, and installation of water efficient plumbing fixtures and equipment to conserve energy use and facilitate maintenance.

## II. GENERAL PROJECT MANUAL AND SPECIFICATIONS STANDARDS

### 1. Cover and Title Page:

Project manuals shall be spiral or GBC bound with heavy front and back covers. Pages shall be duplex (front and back) printed. The cover and title page shall contain the 3 line project title in minimum 18 point size. If the project manual is greater than 1-1/2 inches thick, divide it into two volumes. Do not break it within a division. Sample Three Line Project Title:

Public Works Project No. X93-007	(Project Number)
Equestrian Therapy Area	(Project Description)
Hoosier State Hospital/DMH	(Institution [location]/Agency)

**Personages:** Use correct titles, correct persons, and correct spellings. Include the Governor, the Commissioner of the Department of Administration, the Public Works Director, the Using Agency's Commissioner or Director, and the Superintendent of the Institution. DAPW will provide this information. The proper abbreviation for Public Works Division is DAPW, not DPW.

**Designer's identification:** Include the Designer's name, address, telephone number, fax number, E-mail address, project number, and logo. Include the project manager's name. Include name, address, telephone number, fax number, and E-mail address of all consultants. If there is a project specific website, include that information.

**Organization:** The project manual shall be organized according to CSI MP-2-1 *MasterFormat* (1995). Specification sections shall be organized according to CSI MP-2-2 *SectionFormat* (1997). Pages shall be formatted and numbered according to CSI MP-2-3 *PageFormat* (1992), except that indenting may be eliminated to reduce paper usage. *MasterSpec* and *SpecText* sections are acceptable as long as they are edited to suit the project. Abbreviations shall be based upon CSI UDS Module 5 (1999). State forms shall be printed double sided in the colors provided. Specifications shall be printed double sided on white paper. Detail and Schedule manuals are acceptable. Black and white photographs are acceptable provided that they reproduce clearly when photocopied. Coordinate specifications with drawings. *Ensure that manufacturers'/Masterspec/Spectext standard specification sections are edited to suit the project.*

**Specifying methods:** Use a descriptive, performance, or reference standard methods wherever. Utilize a proprietary method when necessary or desirable, listing three acceptable products by manufacturer and model number. Use an open proprietary method for generic materials only, but avoid use of "equal", "or approved equal," "as approved," "as authorized," etc. Ensure that proprietary products meet all descriptive, performance, or reference standard criteria specified. Where all items are not completely equal, fully describe the differences. Specify whether custom colors or fabrication will be necessary to make an item acceptable. Itemize full criteria for acceptability. If more than one method is used, ensure that there are no conflicts between them. Do not mix descriptive and performance methods for the same item in a section. If reference standard method is used, completely understand all aspects of the standard, incorporate it properly, and enforce its requirements.

## 2. Introductory, Bidding, and Contracting Standards:

Provide a complete Table of Contents including State forms, specifications, and drawing list. If multiple volumes are used, the title page and complete table of contents must be in all volumes, located at the beginning of each volume. Obtain state forms immediately prior to printing the bidding documents. Proposed modifications to state forms, such as *Supplementary Instructions to Bidders* or *Supplementary Conditions*, must be submitted to the DAPW Project Manager for review one month prior to the release of Bidding Documents. Request that post bid submittals such as unit prices and subcontractor, material, supplier, or product lists be submitted to the designer within 24 hours after the receipt of bids. Questions, clarification requests, and substitution requests should be addressed in writing by addendum. The designer shall organize and write addenda and incorporate consultants' comments in the body of the text using the same sequencing as the Table of Contents. Do not issue an addendum later than 7 calendar days prior to bidding without extending the bid date.

**DAPW Notice to Bidders:** The DAPW Project Manager will prepare the notice. Coordinate with the project manager information on the bid date and time, plan deposit, plan availability and pre-construction conference date, time and location. On projects over \$150,000, prime bidders must be pre-qualified with the Public Works Certification Board.

## III TECHNICAL SECTION STANDARDS

### DIVISION 1 GENERAL REQUIREMENTS

**Section 01100 Summary of Work:** Actually describe the project and its parameters. Describe work sequencing and milestones. Identify owner-furnished items as OFOI (owner furnished owner installed) or OFCI (owner furnished contractor installed).

**Section 01120 Alteration Procedures:** Methods and materials to be utilized for patching, altering and extending existing work. Copy is available from DAPW.

**Section 01220 Remediation Allowance:** Allowances must be authorized by DAPW. If this section is required by Public Works, the text will be provided and must be incorporated with modification.

**Section 01230 Alternates:** Add alternates are preferred to deduct alternates because they maximize savings. Use a maximum of six alternates. Alternates must be clearly and completely explained. If they are for alternate products or systems, ensure that the appropriate specification sections are included and labeled as such. If they are for areas or floors of the building, ensure that the appropriate drawings are included and labeled as such. Final text of section and each alternate must be approved by DAPW.

**Section 01250 Contract Modification Procedures:**

Remediation allowance: Specify that requests for use of funds must be in writing and accompanied by complete documentation so that a change order can be generated if necessary. The cost of authorized remediation work must fit within the remaining balance of the allowance.

Change orders: Know the allowable mark-ups stated in the General Conditions. Do not permit sales or use tax. Do not permit Federal excise tax. Ensure that the contractor has provided complete, legible, and accurate documentation. Ensure that the math is correct. Faxed documentation is acceptable, however the DAPW 34 signature sheet MUST bear original signatures.

**Section 01270 Unit Prices:** Specify that unit prices will not affect contract award. Specify that unit prices shall include material, labor, equipment, overhead, and profit. List all unit prices in this section; do not list unit prices in the text of the specifications. Final text of section must be approved by DAPW.

**Section 01311 Electronic Project Management:** on projects selected by DAPW, designer and contractor shall participate in an Internet based management service collaboration with DAPW. Copy available from DAPW.

**Section 01320 Construction Progress Documentation:** Specify a milestone schedule that includes a submittal schedule. Specify a network schedule analysis which includes order and delivery dates. Specify weekly or monthly schedule reviews and updates. Specify that float time belongs to the State.

**Section 01330 Submittal Procedures:** Provide a submittal matrix identifying each submittal required (sample available). Specify a submittal schedule. Request Material Safety Data sheets (for review only) on all products and materials used, whether or not they are incorporated into the structure. Direct that initial submittals be submitted to the designer only. Copies of all correspondence shall be sent to the designer, the contractor, and DAPW.

**Section 01355 Carpet/Carpet Tile Reclamation:** Recycling of existing carpet and new installation waste. Copy available from DAPW.

**Section 01355 Ceiling Tile/Panel Reclamation:** Recycling of existing ceiling tile/panels and new installation waste. Copy available from DAPW.

**Section 01350 Special Procedures:** Accommodate the needs of and specify special procedures for security institutions (the Department of Correction requires incorporation of their Section 01540 Security Procedures), mental health institutions, and residential educational institutions such as the Indiana School for the Blind, Indiana School for the Deaf, and the Indiana Soldiers' and Sailors' Children's Home.

**Section 01451 Testing Laboratory Services:** Testing agencies shall be certified by the Public Works Certification Board. Testing agencies shall provide a firm quotation for their services based on an estimate from the contract documents. Additional costs for testing during construction shall be submitted to DAPW for approval prior to that testing, established by previously approved unit prices. Document re-testing costs so that, if the work is rejected, they can be paid for by the contractor. Test reports shall be copied to the DAPW project manager.

**Section 01500 Temporary Facilities and Controls:** Arrange them with DAPW and the Using Agency. Contractor shall pay for temporary service installation and usage. Temporary service shall meet IOSHA standards and the Indiana Electrical Code. The State may choose to provide steam or hot water for temporary heat once systems are complete (if it is in its best interest to do so). Utility connections and disconnections must be authorized in writing by DAPW. Connections shall be inspected and approved after completion and prior to backfilling. Do not permit trash burning.

Contractor shall remove all trash and waste material. Contractor shall familiarize himself with and obey regulations for the waste disposal site. Contractor shall pay fees for his use of the waste disposal site. Temporary office shall accommodate the Owner's Site Representative and storage of record documents

**Section 01505 Construction and Demolition Waste Management:** Procedures to reduce the amount of material deposited in landfills. Coordinate with demolition section. Designer to investigate to determine the involved products and materials and incorporate recycling and reuse as far as practical for the size of the project and the scope of work. Copy available from DAPW.

**Section 01510 Remediation of Hazardous Products:** Procedures to be utilized in removal of various hazardous products that may occur within existing buildings. Designer and facility representative to survey project to determine involved products. Copy available from DAPW.

**Section 01630 Product Substitution Procedures:** Substitutions prior to bidding shall be in accordance with the Instructions to Bidders and will be acceptable only if included in an addendum. This means that substitution requests must be submitted a minimum of 14 days prior to bidding. Substitutions after bidding require the written approval of the DAPW project manager as well as the designer. They will not be considered unless the specified products are unavailable or deemed unsuitable by DAPW. Final text of section must be approved by DAPW.

**Section 01660 Product Storage and Handling Requirements:** For products, follow manufacturers' instructions and recommendations. For materials, follow trade association standard procedures. DAPW pays for stored materials only if they are properly stored on the site.

**Section 01731 Cutting and Patching:** Cutting and patching shall be performed by the appropriate trade for the substrate and be accomplished by workmen skilled in the required trades.

**Section 01732 Selective Demolition:** Coordinate items to be salvaged with DAPW and the institution. Specify that demolition shall be handled with care and demolished materials (other than those specified for salvage) be recycled wherever possible and practical. Separate, store, protect, and handle at the site, identified recyclable and salvageable waste products in order to prevent contamination of materials. Arrange for timely pick-up and delivery to recycling facilities to prevent contamination of recycled materials. Historical, paleontological, or archaeological finds shall be immediately reported to DAPW.

**Section 01740 Cleaning:** Specify both progress (daily and weekly) and final cleaning. Masonry cleaning shall take place as each area is complete.

**Section 01750 Starting and Adjusting:** Coordinate requirements for start-up and adjustment of products and building systems with DAPW and the institution.

**Section 01760 Protecting Installed Construction:** Specify protection in accordance with product or material manufacturers' and trade associations' instructions and recommendations.

**Section 01780 Closeout Submittals:** See Part IV Record Document Standards.

**Section 01820 Demonstration and Training:** Require a training session on operation and maintenance of each building system (especially mechanical and electrical systems.) The designer (and consultant) shall attend this session. The length of a session shall be determined by the complexity and extent of the building system. The minimum length shall be two hours. Require the contractor to videotape the training session(s) and provide the videotape(s) for the institution's future use.

## DIVISION 2 SITE CONSTRUCTION

**Section 02315 Excavation and Fill:** Know the soils at the site. Incorporate soils engineer's recommendations concerning compaction and equipment. If it is necessary to employ both descriptive and performance specifications, mix them carefully. Do not require, for example, equipment that will not produce the specified maximum dry density. Ensure that compaction specifications, borrow locations, etc. are appropriate for the soil types and site topography. Reference this section from Divisions 15 and 16.



**Section 02360 Termite Treatment:** Termite control is necessary when wood framed construction is approved by DAPW.

**Section 02530 Sanitary Sewerage:** Cast iron or concrete pipe. Precast concrete structures with cast iron lids and frames.

**Section 02630 Storm Drainage:** Clay or plastic pipe up to 8"; concrete pipe 8" and over. Precast concrete structures with cast iron lids and frames.

**Section 02740 Flexible Pavement:** Specify using current edition of *Indiana Department of Transportation Standard Specifications*.

**Section 02821 Chain Link Fences and Gates:** Maximum two inch diamond mesh fabric with 9 gage steel wire. DOC projects require special security fencing.

#### DIVISION 3 CONCRETE

**Section 03050 Basic Concrete Materials and Methods:** Provide air entrainment in exterior concrete, foundations, and cooler/freezer slabs. Do not specify or permit use of admixtures unless authorized by DAPW. Specify hot and cold weather protection and methods. Review and incorporate latest ACI code requirements.

**Section 03100 Concrete Forms and Accessories:** Use biodegradable permanent form work where possible and practical. If removable form work is used, ensure that the form coating is non-staining and compatible with the finish to be applied to the formed surface.

**Section 03240 Fibrous Reinforcing:** Consider using nylon or polypropylene fiber as secondary reinforcement.

**Section 03300 Cast In Place Concrete:** Consider specifying local flatness/levelness tolerances using F-numbers. Pick F-numbers appropriate for the function of structure (or room). Interior floors shall be hard trowel finish. Exterior walks, curbs, steps, stairs, and docks shall be medium broom finish.

**Section 03390 Concrete Curing:** Ensure that curing method/compound is compatible with scheduled floor finishes and sealers. Use a method other than curing compound for floors to receive thin set terrazzo, ceramic tile, quarry tile and other finishes which require a bond to the concrete.

**Section 03400 Precast Concrete:** For architectural precast, specify that the precast producer's quality plan shall incorporate the Precast/Prestressed Concrete Institute's MNL-117-96. The producer shall be PCI certified for the type of precasting desired. Specify finish mock-ups. Ensure that curing method/compound is compatible with scheduled finishes and sealers. At projects using both structural and architectural precast, use a separate section for each type.

#### DIVISION 4 MASONRY

**Section 04065 Masonry Mortar:** Use non air-entrained portland cement/hydrated lime mortar for brick masonry and exterior concrete masonry. Pre-blended and bagged portland cement/hydrated lime mixes meeting ASTM C150 and C207 are preferred. Type S is preferred below and at grade and Type N above grade. Consider using a premixed mortar system. Masonry cement mortar may be used for interior concrete masonry only. Do not use admixtures unless authorized by DAPW. Specify portland cement to be low-alkali, non-staining, or white. Specify natural sand only. Specify proper type for location using ASTM C270 proportion method for natural gray mortars and proprietary method for white or colored mortars. Completely fill mortar joints. Joint tooling at face brick shall be concave or vee type (these are the most moisture-resistant). Minimize use of colored mortar. If colored mortar is desired, consider hue, shade, intensity, and consistency. Joint tooling at concrete unit masonry shall be concave except where cavity wall insulation, sheet membrane waterproofing, vinyl wall covering, veneer plaster, or plaster wall liner is scheduled. Under these circumstances, the joints shall be struck flush after compaction. Tuckpoint historic structures with mortar mix matching original.

**Section 04810 Unit Masonry Assemblies:** Review and incorporate Indiana Building Code Requirements for Masonry Structures. Specify hot and cold weather protection and methods.

A. Brick and mortar shall have complementary suction rates. Low IRA brick is preferred. Consider efflorescence, bonding, and durability in selection. Specify a mock-up. Running bond is preferred.

B. Use lightweight aggregate concrete masonry units (CMU) unless DAPW specifically directs otherwise. Running bond is preferred. Use bullnose units at corners and jambs. Grout steel frames full with mortar.

C. Ties and reinforcement in exterior walls shall be hot dip galvanized (1.5 oz. zinc/sf ) in accordance with ASCE 6/ACI 530.1. Joint reinforcement in interior walls in high humidity areas shall be hot dip galvanized to a minimum of 1.5 oz. zinc/sf. Joint reinforcement in interior walls which are not in high humidity areas may be mill galvanized to a minimum of 0.8 oz. zinc/sf ASTM A641 Class 3.

D. Flashing shall be 0.25mm stainless steel, lead coated copper, or 5oz copper flashing bonded both sides with asphalt and kraft paper. Specify weep holes/vents. Polypropylene cell vents are acceptable. Specify mortar dropping collection devices to be placed into the wall cavity space.

**Section 04851 Stone:** Specify that shop drawings for anchorage shall be certified by an Indiana registered professional engineer. Designer shall promote the use of Indiana native materials.

**Section 04900 Masonry Cleaning:** Do not use acid. Cleaners must be V.O.C. compliant. Limestone cleaning shall be as recommended by the Indiana Limestone Institute. Add special requirements for masonry restoration work in compliance with industry association recommendations for the type of masonry involved.

## DIVISION 5 METALS

**Section 05310 Steel Deck:** Specify galvanized ASTM A525 G90 floor and roof decking. Do not paint areas that will be spray fireproofed. If ribbed decking will be exposed, consider spray applied acoustical insulation underneath. Welded decking in place must be inspected and tested.

**Section 05410 Load Bearing Metal Studs:**

**Section 05420 Cold-Formed Metal Joists:**

Specify galvanized and painted rather than painted only. Studs and runners shall be a minimum of 3-5/8 inch by 18 gage. Joists and runners shall be a minimum of 6 inch by 18 gage. Evaluate the structural properties of the framing to determine appropriate sizes and gages.

**Section 05500 Miscellaneous Metal:** Specify that shelf angles and lintels in masonry construction be hot dip galvanized to a minimum of 1.5 oz. zinc/sf.

**Section 05510 Metal Stairs and Ladders:** Stair detailing - Specify fabrication of ladders in accordance with ANSI A14.3 Safety Code for Fixed Ladders and NFPA 1.01-5-2.9.2. Specify that shop drawings of ladders and stairs shall be certified by an Indiana registered professional engineer.

**Section 05520 Handrails and Railings:** Specify that shop drawings shall be certified by an Indiana registered professional engineer.

## DIVISION 6 WOOD AND PLASTICS

**Section 06070 Wood Treatment:** Specify that blocking shall be both fire retardant and moisture resistant.

**Section 06134 Pole Construction:** Consult with DAPW for specific requirements.

## DIVISION 7 THERMAL AND MOISTURE PROTECTION

**Section 07190 Water Repellents:** Utilize low VOC water based isobutyltrialkoxysilane warranted for the substrate; applied in 2 coats with an additive fugitive dye to aid in application.

**Section 07130 Sheet Waterproofing:** Specify self-adhering lamination of rubberized asphalt and polyethylene film or modified bitumen sheet. Specify protection and drainage board overlay.

**Section 07240 Exterior Insulation and Finish Systems:** Avoid use of these systems.

**Section 07260 Vapor Retarders:** Specify heavy-duty reinforced type for underslab applications. Specify seam and penetration sealing with barrier manufacturer's tape.

**Section 07500 Membrane Roofing:** Low slope roofing shall be fully adhered or mechanically fastened EPDM or hot-applied modified bitumen. Roof surfaces shall slope a minimum of 1/4" per foot to drain. Interior drains shall be recessed below adjacent roofing. Provide chemical resistant membrane at kitchen exhausts. Steep roofing shall be metal or shingles only and must be authorized by DAPW. Shingle roofing shall have rubberized asphalt underlayment at the perimeter. Specify polyisocyanurate or extruded polystyrene insulation. Specify a vapor retarder for high-humidity areas. Specify roof walk pads that are acceptable to the roofing membrane manufacturer.

**Section 07620 Sheet Metal Flashing and Trim:** Develop requirements for both manufactured and fabricated products in accordance with the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards.

**Section 07710 Manufactured Roof Specialties:** Specify pre-manufactured roof curbs and flashing to prevent leakage.

**Section 07810 Applied Fireproofing:** Provide a current specification with manufacturers, products, and UL rated systems. Clearly Indicate areas where required.

**Section 07840 Firestopping:** Provide a current specification with manufacturers, products, and UL rated systems. Provide a schedule of appropriate systems for penetrating item and assembly being penetrated. Address intersections between the top of a partition and bottom of the structure above. Address joints. Reference this section from Divisions 15 and 16.

## DIVISION 8 DOORS AND WINDOWS

**Section 08110 Steel Doors and Frames:** Frames shall be minimum 16 gage welded type (no knock down type). Grout steel frames in masonry. Specify Steel Door Institute standards; grade II model E minimum doors; galvanized at exterior openings. Incorporate special requirements for Department of Correction projects.

**Section 08210 Wood Doors:** Solid staved core (except mineral core for fire rated doors), five-ply, pre-finished, and predrilled for hardware.

**Section 08310 Access Doors and Panels:** Locate where maintenance access is necessary. Specify and indicate. Reference this section from Divisions 15 and 16. Some Institutions have special requirements.

**Section 08500 Metal Windows:** State performance class designations based upon AAMA/NWWDA 101/I.S.2-97 and request certification labeling from the National Fenestration Rating Council.

**Section 08710 Door Hardware:** Specify appropriate ADA-compliant hardware for function and occupancy. Consider use of an Architectural Hardware Consultant certified by the Door and Hardware Institute. Coordinate electrical hardware with fire alarm system. Incorporate special requirements for Department of Correction Projects.

## DIVISION 9 FINISHES

**Section 09220 Portland Cement Plaster:** Use for exterior soffits and interior ceilings of high humidity areas.

**Section 09260 Gypsum Board Assemblies:** Specify galvanized and painted steel framing rather than painted only. Studs and runners shall be a minimum of 3-5/8 inch by 20 gage. Specify/detail triple studs at corners and intersections; double studs at jambs. Evaluate the structural properties of the framing to determine appropriate sizes and gages. Use 5/8 inch thick Type X (ASTM C36) gypsum board throughout. Consider using cellulose fiber reinforced gypsum board. As a substrate for ceramic tile, use tile backer board such as USG *Durock Cement Board*, *Fin-Pan Util-I-Crete*, or Georgia-Pacific *DensShield*. Specify moisture resistant gypsum board at high humidity areas, but do not use it as a tile base. Consider using high impact gypsum board where appropriate. Gypsum sheathing shall be glass fiber reinforced type, such as Georgia-Pacific *DensGlass Gold*. Specify application and finishing using GA-216. Specify finish level using GA-214 (5 levels available).

**Section 09300 Tile:** Specify impervious vitrified glazed tile on walls. Backing at steel-framed partitions shall be glass mesh mortarboard or cement board. Specify high fired unglazed mosaics or quarry tile on floors. Specify installation by TCA method (which includes ANSI standards). Use crack isolation membrane where appropriate. Setting and grouting materials must be V.O.C. compliant. Consider slip resistance, scratch resistance, stain resistance, and cleaning method in tile selection.

**Section 09510 Acoustical Ceilings:** Do not use suspended panels with concealed grid. Use aluminum grid and ceramic type ceiling panels in high humidity areas. Adhesives for glued 12" by 12" tile must be V.O.C. compliant. Do not support ceiling grid systems from ductwork, electrical conduit, heating or plumbing lines. Each system shall be independently supported from the building structure. Where interferences occur, provide trapeze type hangers or other suitable support for each system. Locate hangers and supports so that they will not interfere with access to mixing boxes, fire dampers, valves, filters, and other items requiring routine servicing and maintenance. All panels shall be manufactured with minimum 50% recycled content. Panel manufacturer shall recycle existing tile/panels. Copy available from DAPW.

**Section 09650 Resilient Flooring:** Vinyl composition tile is most often used; rubber and recycled rubber is desirable for some locations. Consider slip resistance, scratch resistance, and cleaning method in tile selection. Vinyl or rubber base shall be 1/8" thick with pre-molded corners. Use rolls or 10' pieces as appropriate for the project vicinity. Adhesives must be V.O.C. compliant.

**Section 09670 Fluid Applied Flooring:** Consult with DAPW before specifying. Do not use polymer finish floors.

**Section 09680 Carpet and 09681 Carpet Tiles:** Carpet shall have a minimum 25 percent recycled content. Carpet installation waste and existing carpet removed, shall be recycled by the manufacturer. All carpet yarn shall be solution dyed. Carpet shall be textured loop, traffic class III, extra heavy with static control and anti-microbial treatment. Specify V.O.C. compliant adhesives. Copies available from DAPW.

**Section 09720 Wall Covering:** Minimize its usage. Federal Specification CCC-W-408A Type III Heavy Duty with a minimum total weight of 22 oz/sq yd. Class 2 mildew resistant with 3.6 oz/sq yd polyester cotton drill backing. Adhesives must be V.O.C. compliant. Double cut lapped seams.

**Section 09900 Paints and Coatings:** Shall be V.O.C. compliant. Use PDCA benchmark painting samples. Latex paint shall be commercial quality capable of withstanding repeated washings. Use semi-gloss, satin and eggshell lusters. Take lighting into account. Reference this section from Divisions 15 and 16.

## DIVISION 10 SPECIALTIES

**Section 10155 Compartments and Cubicles:** Toilet compartments, shower compartments, dressing compartments, and urinal screens shall be solid high density polyethylene with integral hinges, floor mounted and overhead braced, heavy duty hardware. Provide ADA compliant design of spaces.

**Section 10260 Wall and Corner Guards:** Use heavy-duty guards at locations where bumping is likely.

**Section 10350 Flagpoles:** Do not use internal flag type.

**Section 10800 Toilet Accessories:** Specify stainless steel. Do not specify soap dispensers since they are usually provided by the soap supplier. Do not use recessed trash receptacles. Do not use hot air hand dryers. Provide ADA compliant design and mounting heights.

#### DIVISION 11 EQUIPMENT

**Section 11400 Food Service Equipment:** FOOD FACILITIES CONSULTANT shall provide general requirements to the designer for incorporation in Division 1. In the technical specification, do not address directions to various trades. If a consultant wants to address a trade not his own, he must provide these directions to the designer.

#### DIVISION 12 FURNISHINGS

#### DIVISION 13 SPECIAL CONSTRUCTION

**Section 13150 Swimming Pools:** Comply with Indiana Swimming Pool Code. Use Type K cement. Use polysulfide sealants for water immersed joints.

**Section 13900 Fire Suppression Systems:** Specify that sprinkler shop drawings shall be sealed by an Indiana registered professional engineer.

#### DIVISION 14 CONVEYING SYSTEMS

#### DIVISION 15 MECHANICAL

Provide general requirements to the designer for incorporation in Division 1. In the technical specification, do not address directions to various trades. Do not require any additional documentation to be submitted with bids. Ensure that excavation, backfill, rock removal, firestopping, access doors, and painting are referenced to the appropriate technical specification section rather than specified multiple times differently. Specify complete mechanical and plumbing systems identification. Wrap underground utilities with identifying tape detectable by metal detectors. Ensure that appropriate clearance above ceiling is provided for maintaining plumbing, HVAC, and fire protection systems. Coordinate with electrical systems. Coordinate with food service consultant (if present). Do not penetrate rated floor and wall assemblies with pipes or ducts unless the openings are appropriately firestopped. Penetrations may also require structural considerations.

Show locations of all waste line cleanouts and verify ease of access for maintenance. Do not route domestic water, steam, or chilled water lines through rooms containing the main electrical switchgear, panels, substations, or similar equipment.

Each utility system shall be independently supported from the building structure. Where interferences occur, provide trapeze type hangers or other suitable support for each system. Locate hangers and supports so that they will not interfere with access to mixing boxes, fire dampers, valves, filters, and other items requiring routine servicing and maintenance. Provide permanent identification for all air handling equipment, pumps and valves. Provide complete piping identification. Provide identification of concealed equipment on finished surfaces (walls/ceilings). Notify designer of locations requiring access panels. Notify designer of equipment requiring raised concrete housekeeping pads.

Specific design of all HVAC systems shall be provided with the building schematic and design development submittal milestones. The schematic design submittal shall consist of a written description of all systems and include proposed standards for design and a code analysis. It shall also include verification of available utilities at the site (water, sanitary sewer, storm drainage, steam, electrical voltage and capacity, etc.) The design development submittal shall include drawings showing equipment layouts and locations, single line duct layouts, mechanical and plumbing equipment schedules, and preliminary calculations. Design of systems and selection of equipment shall include energy conservation as a primary goal. Designer shall promote the use of Energy Star rated equipment wherever possible.

## DIVISION 16 ELECTRICAL

Provide general requirements to the designer for incorporation in Division 1. In the technical specification, do not address directions to various trades. Do not require any additional documentation to be submitted with bids. Ensure that excavation, backfill, rock removal, firestopping, access doors, and painting are referenced to the appropriate technical specification section rather than specified multiple times differently. Ensure that appropriate clearance above ceiling is provided for electrical, communication, and fire alarm systems. Coordinate with mechanical systems. Coordinate with food service consultant (if present). Coordinate with owner's communication equipment specialist. Notify designer of equipment requiring raised concrete housekeeping pads. Panelboards, motor starters, and switchgear shall be furnished by a single manufacturer. Wrap underground utilities with identifying tape detectable by metal detectors. Require nameplates for motors, motor starters, push-button stations, control panels, time switches. Require nameplates for disconnect switches, switchboards, panelboards, circuit breakers, contactors and relays in separate enclosures. For stud and drywall construction, use armored cable for wiring. For all other construction, use conduit. Construction documents should include appropriate schedules for equipment stating sizes, types, styles, catalog numbers, and other pertinent characteristics. Designer shall promote the use of Energy Star rated equipment wherever possible.

Provide specifications that are applicable to the project, listing the correct voltage, circuit elements, products, and wiring methods for the particular work at hand. Provide calculations performed to obtain load analysis, service size, and transformer capacities, available fault currents and voltage drop, as well as the coordination study and the resulting sizing of equipment made from them. Provide a single line diagram with all primary and secondary distribution equipment and loads located in plain view, with initial spatial coordination performed. Make, confirm, and indicate service entrance arrangements with the utility. Review and indicate mechanical equipment power requirements and physical locations including mounting, connecting, and testing. Provide control diagrams and schematics revealing interactive relationship as well as operating logic for all systems. Provide information adequate to understand and install appropriate wiring. Do not penetrate rated floor and wall assemblies with conduit unless the openings are appropriately firestopped. Penetrations may require structural considerations. Isolate electrical equipment from pipes and other equipment serviced by water or steam.

Lighting fixtures and utility systems shall be independently supported from the building structure. Where interferences occur, provide trapeze type hangers or other suitable support for each system. Locate hangers and supports so that they will not interfere with access to mixing boxes, fire dampers, valves, filters, and other items requiring routine servicing and maintenance. Notify designer of locations requiring access panels. Show branch circuiting (with voltage drop considerations) for both power and lighting, including switching, dimming, special controls, and home run designations.

### III. DRAWING STANDARDS

1. Overall organization: Organize drawings according to CSI UDS *Uniform Drawing System*, 1999 Edition. Coordinate drawings with specifications. Coordinate drawings between disciplines.

2. Sheet Organization: See the *Uniform Drawing System*. Maximum sheet size shall be 30 inches by 42 inches (ARCH F/5). Only GIS/mapping sheets may use larger sizes upon DAPW prior approval. Minimum sheet size shall be 11 inches by 17 inches (ANSI B). Addendum and clarification drawings shall be 8-1/2 inches by 11 inches (ANSI A). Include the sheet title. The title block shall contain the three-line project title provided by DAPW.

3. Required Drawings

Drawing sets with five or more sheets shall have a **cover sheet**. The cover sheet shall display the three-line project title in 1 to 2 inch high letters. The personages shall be the same as the project manual cover. Provide all information concerning the designer and consultants as required for the project manual. Include a DAPW provided facility map and an area map with the project area highlighted; a key plan; an index of drawings; and a building code/energy statement listing construction type, occupancy type, building area and height, allowable area and height, area and height increases, "U" values for the foundation, exterior walls, and roof, and variances requested (if any) including their status.

Architectural **plans** shall be 1/8" = 1'-0" scale minimum. Enlarged plans shall be 1/4"=1'-0" scale. Do not use 1/16", 3/8", 3/16", 3/32" scales. Indicate plan scale in title block. If more than one scale is used on a sheet, put "as noted" in the title block. Provide a key plan for coordination if plans are match lined. Provide floor plans, reflected ceiling plans, and a roof plan. Provide a separate equipment plan if more than 10 items are involved. Engineering plans shall be the same scale as the architectural plans. Structural drawings or floor plans shall show design live load for each floor and roof. Lighting plans shall show design lighting levels for each room. Provide a partition construction key, listing UL design and/or Gypsum Association file numbers. Clearly indicate/completely detail fire or sound rated assemblies. Show final room numbers and names on all plans.

**Elevations** shall be the same scale as the plans. Provide full elevations for all faces. Show expansion/control joints to control cracking.

Provide both transverse and longitudinal **building sections** (foundation to roof). Use 1/8" = 1'-0" scale. Use match lines if necessary. Clearly indicate fire and sound rated assemblies. Show final room numbers and names.

Provide **wall sections** using 3/4" or 1" =1'-0" scale. Sections shall be full height (foundation to roof or parapet). Show reinforcement and connector details for masonry (including stonework). Employ consistent terminology, coordinated with specifications.

**Details** shall be 5-3/4" wide by 6" high (or multiples of this module) and drawn in 1-1/2" or 3" =1'-0" scale. Employ consistent terminology, coordinated with specifications. Tailor manufacturers' standard details to suit the project, removing inappropriate references. Use of a detail manual cross referenced with the drawings is acceptable.

**Schedules:** See the *Uniform Drawing System* for types and templates. Provide a schedule of UL systems used, including locations. Architectural schedules may include metal fabrications, expansion control, fireproofing, firestopping, joint sealers, door and frame, access doors and panels, windows, skylights, room finish, louver and vent, signage, toilet, bath, and laundry accessories. Door and frame schedules shall include openings, borrowed lights, both exterior and interior doors, and aluminum/glass storefront systems. Coordinate the schedule with the details. Hardware schedules may be located in the project manual. Do not issue hardware schedules by addendum. Room finish schedules shall cover all surfaces of all rooms and shall include color selections. Room finish schedules shall be consistent with material designations on floor plans, reflected ceiling plans, elevations, sections, and details. Use of a schedule manual is acceptable.

Use consistent **symbols**; see CSI TD-2-6 *Standard Reference Symbols*. Use consistent material indications, line types, and dimensions. Minimum lettering height for notation shall be 1/8 inch. Use consistent **abbreviations**; see CSI TD-2-4 *Abbreviations*.

Refer to the **Public Works Cad Drawing Standards** for Computer Aided Design and Drafting (CADD) requirements. The latest version is always available on the Internet at <http://www.state.in.us/idoa/pwd/cadstds.html>

#### IV. RECORD DOCUMENTS STANDARDS

1. Specify that Contractor shall continuously maintain a set of as-built drawings to indicate deviations from the original design and the actual placement of equipment, piping, wiring, and underground utilities.
2. Specify that Contractor shall continuously maintain an as-built project manual with notations of products, manufacturers, models, colors, patterns, accessories and adhesives selected. Fully describe substitutions. Indicate selected alternates and options.
3. Specify that Contractor shall continuously maintain annotated approved submittals, CORs, RFIs, ASIs, and miscellaneous correspondence.
4. The Designer shall produce record documents based upon the Contractor's as-built drawings AND his/her knowledge of the project.
5. Provide prints, reproducible copies and electronic copies of record documents as indicated in the *Designer Manual* and the *Public Works Cad Drawing Standards*.

6. Each drawing shall be marked either "CORRECTED TO AS-BUILT" or "NO CHANGES - INSTALLATION AS SHOWN" in 3/4" high letters. Each page of the project manual shall contain this note in a header.
7. Provide an updated single line diagram of the building electrical system if the original system has been changed.
8. Electrical drawings shall accurately list numbered labels for wiring.
9. Fire alarm drawings shall show the complete system in elementary/ladder diagram format. Diagrams shall indicate actual wire identification numbers for future troubleshooting purposes.
10. Refer to the *Designer Manual* and the *Public Works Cad Drawing Standards* for additional information.

## **V. RESOURCES**

1. Construction Specifications Institute (800) 689-2900
  1. MP-SP *Manual of Practice - Specifications Package* (1996)
  2. MP-2-1 *MasterFormat*, 1995 Edition
  3. MP-2-1a *1988-1995 MasterFormat Comparative Matrix*
  4. MP-2-2 *SectionFormat* (1997)
  5. MP-2-3 *PageFormat* (1992)
  6. MP-2-4 *UniFormat* (1992)
  7. TD-2-5 *Sources of Construction Information* (1997)
  8. TD-2-6 *Standard Reference Symbols* (1991)
  9. TD-2-7 *Project Design Team Coordination and Checklist* (1991)
  10. TD-2-8 *Guide to Preparing Design and Construction Documents for Historic Projects* (1996)
  11. UDS *Uniform Drawing System*, 1999 Edition
2. American Institute of Architects (800) 365-ARCH
  1. *The Architect's Handbook of Professional Practice, Twelfth Edition*, (1994)
  2. *Architectural Graphic Standards, Ninth Edition*, (1994 + 1997 Supplement)
  3. *CAD Layer Guidelines, Second Edition* (1997)
3. Public Works Division, Indiana Department of Administration
  1. *DAPW Designer Manual*
  2. *DAPW Cad Drawing Standards*